CLAIMS

What is claimed is:

1.   1. A method for encoding a video stream to generate an encoded video bitstream, comprising the
2. steps of:
3.   (a) encoding, into the encoded video bitstream, a first original frame/region in the video stream using
4. intra-frame coding to generate an encoded first frame/region; and
5.   (b) encoding, into the encoded video bitstream, a second original frame/region in the video stream
6. using motion-based predictive coding, wherein at least some motion information used during the motion-
7. based predictive coding is excluded from the encoded video bitstream.

1.   2. The invention of claim 1, wherein all of the motion information used during the motion-based
2. predictive coding is excluded from the encoded video bitstream and the encoded video bitstream does not
3. explicitly include any motion information.

1.   3. The invention of claim 1, wherein step (b) comprises the steps of:
2.   (1) decoding the encoded first frame/region to generate a decoded first frame/region;
3.   (2) encoding the second original frame/region to generate an encoded second frame/region;
4.   (3) decoding the encoded second frame/region to generate a decoded second frame/region;
5.   (4) performing motion computation between the decoded second frame/region and the decoded first
6. frame/region to generate the motion information;
7.   (5) applying the motion information to the decoded first frame/region to generate a synthesized second
8. frame/region;
9.   (6) performing inter-frame differencing between the synthesized second frame/region and the second
10. original frame/region to generate residual errors; and
11.   (7) encoding, into the encoded video bitstream, at least some of the residual errors.

1.   4. The invention of claim 1, further comprising the step of:
2.   (c) encoding, into the encoded video bitstream, a third original frame/region in the video stream using
3. tweening based on the motion information used to encode the second original frame/region.

1.   5. A video encoder for encoding a video stream to generate an encoded video bitstream, comprising:
2.   (a) a frame/region type selector configured for selecting different processing paths for encoding
3. different frames/regions into the encoded video bitstream;
4.   (b) a first processing path configured for encoding, into the encoded video bitstream, a first original
5. frame/region in the video stream using intra-frame coding to generate an encoded first frame/region; and

6   (c) a second processing path configured for encoding, into the encoded video bitstream, a second

7   original frame/region in the video stream using motion-based predictive coding, wherein the video encoder

8   has an encoding mode in which at least some motion information used during the motion-based predictive

9   coding is excluded from the encoded video bitstream.

1   6.   The invention of claim 5, wherein the video encoder is a scaleable video encoder that can be

2   operated at a plurality of different encoding modes, wherein:

3   in a first encoding mode, all of the motion information is excluded from the encoded video bitstream

4   and the encoded video bitstream does not explicitly include any motion information; and

5   in a second encoding mode, at least some of the motion information is encoded into the encoded video

6   bitstream.

1   7.   The invention of claim 6, wherein:

2   in the second encoding mode, a first portion of the motion information is encoded into the encoded

3   video bitstream and a second portion of the motion information is excluded from the encoded video

4   bitstream; and

5   in a third encoding mode, all of the motion information is encoded into the encoded video bitstream.

1   8.   The invention of claim 5, wherein:

2   the first processing path is configured for decoding the encoded first frame/region to generate a

3   decoded first frame/region; and

4   the second processing path is configured for:

5   (1) encoding the second original frame/region to generate an encoded second frame/region;

6   (2) decoding the encoded second frame/region to generate a decoded second frame/region;

7   (3) performing motion computation between the decoded second frame/region and the decoded

8   first frame/region to generate the motion information;

9   (4) applying the motion information to the decoded first frame/region to generate a synthesized

10   second frame/region;

11   (5) performing inter-frame differencing between the synthesized second frame/region and the

12   second original frame/region to generate residual errors; and

13   (6) encoding, into the encoded video bitstream, at least some of the residual errors.

1   9.   The invention of claim 8, wherein the encoding in the first processing path and the encoding of the

2   second original frame/region in the second processing path are based on intra-frame wavelet encoding.

1   10. The invention of claim 8, wherein:

2   the first processing path is configured for intra-frame coding the first original frame/region at a high

3   resolution;

4   the decoded first frame/region is at the high resolution;

5   the second processing path is configured for:

6   (i) spatially sub-sampling the second original image/region to generate a low-resolution second

7   frame/region having a resolution lower than the high resolution; and

8   (ii) intra-frame coding the low-resolution second frame/region to generate the encoded second

9   frame/region;

10   the decoded second frame/region is at the low resolution; and

11   the synthesized second frame/region is at the high resolution.

1   11. The invention of claim 8, wherein the second processing path is configured for:

2   (i) thresholding the residual errors to generate binary data; and

3   (ii) encoding, into the encoded video bitstream, the at least some of the residual errors based on the

4   binary data.

1   12. The invention of claim 5, further comprising a third processing path configured for encoding, into

2   the encoded video bitstream, a third original frame/region in the video stream using tweening based on the

3   motion information used to encode the second original frame/region.

1   13. The invention of claim 12, wherein:

2   the first processing path is configured for decoding the encoded first frame/region to generate a

3   decoded first frame/region; and

4   the third processing path is configured for:

5   (1) temporally interpolating the motion information used to encode the second original

6   frame/region;

7   (2) applying the temporally interpolated motion information to the decoded first frame/region to

8   generate a synthesized third frame/region;

9   (3) generating residual errors between the synthesized third frame/region and the third original

10   frame/region; and

11   (4) encoding, into the encoded video bitstream, at least some of the residual errors.

1   14. The invention of claim 13, wherein:

2   the first processing path is configured for intra-frame coding the first original frame/region at a high

3   resolution;

4   the decoded first frame/region is at the high resolution;

5   the synthesized third frame/region is at the high resolution; and

6   the third processing path is configured for performing inter-frame differencing between the synthesized

7   third frame/region and the third original frame/region to generate the residual errors.

1   15. A method for decoding an encoded video bitstream to generate a decoded video stream,

2   comprising the steps of:

3   (a) decoding, from the encoded video bitstream, an encoded first frame/region using intra-frame

4   decoding to generate a decoded first frame/region; and

5   (b) decoding, from the encoded video bitstream, an encoded second frame/region using motion-based

6   predictive decoding, wherein at least some motion information used during the motion-based predictive

7   decoding is generated by performing motion computation as part of the decoding method.

1   16. The invention of claim 15, wherein the encoded video bitstream does not explicitly include any

2   motion information and all of the motion information used during the motion-based predictive decoding is

3   generated as part of the method.

1   17. The invention of claim 15, wherein step (b) comprises the steps of:

2   (1) decoding, from the encoded video bitstream, the encoded second frame/region to generate a

3   decoded second frame/region;

4   (2) performing the motion computation between the decoded second frame/region and the decoded

5   first frame/region to generate the motion information;

6   (3) applying the motion information to the decoded first frame/region to generate a synthesized second

7   frame/region;

8   (4) decoding, from the encoded video bitstream, encoded residual errors to generate decoded residual

9   errors corresponding to the synthesized second frame/region; and

10   (5) performing inter-frame addition between the decoded residual errors and the synthesized second

11   frame/region to generate an error-corrected decoded second frame/region.

1   18. The invention of claim 15, further comprising the step of:

2   (c) generating a decoded third frame/region using tweening based on the motion information used to

3   decode the encoded second frame/region.

1   19. The invention of claim 15, further comprising the step of de-interlacing a decoded second

2   frame/region generated during step (b) to generate two corresponding fields corresponding to the decoded

3   second frame/region.

1   20. A video decoder for decoding an encoded video bitstream to generate a decoded video stream,

2   comprising:

3   (a) a frame/region type selector configured for selecting different processing paths for decoding

4   different encoded frames/regions from the encoded video bitstream;

5   (b) a first processing path configured for decoding, from the encoded video bitstream, an encoded first

6   frame/region in the video stream using intra-frame decoding to generate a decoded first frame/region; and

7   (c) a second processing path configured for decoding, from the encoded video bitstream, an encoded

8   second frame/region in the video stream using motion-based predictive decoding, wherein the video

9   decoder has a decoding mode in which at least some motion information used during the motion-based

10 predictive decoding is generated by the video decoder performing motion computation.

1   21. The invention of claim 20, wherein the video decoder is a scaleable video decoder that can be

2   operated at a plurality of different decoding modes, wherein:

3   in a first decoding mode, the encoded video bitstream does not explicitly include any motion

4   information and all of the motion information is generated by performing the motion computation by the

5   video decoder; and

6   in a second decoding mode, at least some of the motion information is decoded from the encoded video

7   bitstream.

1   22. The invention of claim 21, wherein:

2   in the second decoding mode, a first portion of the motion information is decoded from the encoded

3   video bitstream and a second portion of the motion information is generated by performing the motion

4   computation by the video decoder; and

5   in a third decoding mode, all of the motion information is decoded from the encoded video bitstream.

1   23. The invention of claim 20, wherein:

2   the second processing path is configured for:

3   (1) decoding, from the encoded video bitstream, the encoded second frame/region to generate a

4   decoded second frame/region;

5   (2) performing the motion computation between the decoded second frame/region and the decoded

6   first frame/region to generate the motion information;

7   (3) applying the motion information to the decoded first frame/region to generate a synthesized

8   second frame/region;

9   (4) decoding, from the encoded video bitstream, encoded residual errors to generate decoded

10 residual errors corresponding to the synthesized second frame/region; and

11   (5) performing inter-frame addition between the decoded residual errors and the synthesized

12   second frame/region to generate an error-corrected decoded second frame/region.

1   24. The invention of claim 23, wherein the decoding in the first processing path and the decoding of

2   the second encoded frame/region in the second processing path are based on intra-frame wavelet decoding.

1   25. The invention of claim 23, wherein:

2   the decoded first frame/region is at a high resolution;

3   the decoded second frame/region is at a low resolution lower than the high resolution;

4   the synthesized second frame/region is at the high resolution; and

5   the error-corrected decoded second frame/region is at the high resolution.

1   26. The invention of claim 20, further comprising a third processing path configured for generating a

2   decoded third frame/region using tweening based on the motion information used to decode the encoded

3   second frame/region.

1   27. The invention of claim 26, wherein the third processing path is configured for:

2   (1) temporally interpolating the motion information used to decode the encoded second frame/region;

3   and

4   (2) applying the temporally interpolated motion information to the decoded first frame/region to

5   generate the decoded third frame/region.

1   28. The invention of claim 27, wherein the decoded third frame/region is not explicitly represented in

2   the encoded video bitstream.

1   29. The invention of claim 27, wherein the third processing path is configured for:

2   (i) applying the temporally interpolated motion information to the decoded first frame/region to

3   generate a synthesized third frame/region;

4   (ii) decoding, from the encoded video bitstream, encoded residual errors for an encoded third

5   frame/region to generate decoded residual errors; and

6   (iii) applying the decoded residual errors to the synthesized third frame/region to generate the decoded

7   third frame/region.

1   30. The invention of claim 29, wherein:

2   the decoded first frame/region is at a high resolution;

3   the synthesized third frame/region is at the high resolution; and

4   the third processing path is configured for performing inter-frame addition between the synthesized

5   third frame/region and the decoded residual errors to generate the decoded third frame/region at the high

6   resolution.

1   31. The invention of claim 20, wherein the second processing path is configured for de-interlacing a

2   decoded second frame/region to generate two corresponding fields corresponding to the decoded second

3   frame/region.

1   32. A method for decoding an encoded video bitstream to generate a decoded video stream,

2   comprising the steps of:

3   (a) decoding, from the encoded video bitstream, a plurality of encoded frames/regions to generate a

4   plurality of decoded frames/regions using motion information; and

5   (b) performing tweening based on the motion information to insert one or more additional

6   frames/regions into the decoded video stream.

1   33. The invention of claim 32, wherein the one or more additional frames/regions are not explicitly

2   encoded in the encoded video bitstream.

1   34. A decoder for decoding an encoded video bitstream to generate a decoded video stream,

2   comprising:

3   (a) one or more processing paths configured for decoding, from the encoded video bitstream, a

4   plurality of encoded frames/regions to generate a plurality of decoded frames/regions using motion

5   information; and

6   (b) an additional processing path configured for performing tweening based on the motion information

7   to insert one or more additional frames/regions into the decoded video stream.

1   35. The invention of claim 34, wherein the one or more additional frames/regions are not explicitly

2   encoded in the encoded video bitstream.